

1. Describe the structure of DNA. In what ways is it distinct from RNA?

DNA is double stranded, RNA is single stranded. DNA has the sugar deoxyribose, RNA has the sugar ribose. DNA has thymine, RNA has uracil.

2. What feature helps keep the two strands in a DNA molecule parallel to each other?

The distance between the strands is held constant by the combinations of pyrimidines hydrogen bonded to their complementary purines.

3. What would be the outcome if replication did not occur properly prior to cell division?

The DNA in the chromosomes of the daughter cells would not have the correct genetic information.

4. List the three functions of DNA and describe the biological significance of each one.

a) Replicate (make copies of itself). Important for cell division as each daughter cell requires the correct number of chromosomes and identical genetic information.

b) Control protein synthesis. The base sequence of the DNA determines which amino acids will be incorporated into the protein to be formed.

c) Mutate. The base sequence can be altered through mutations which change the ability of the cell to produce specific proteins, thus altering the function of the cell.

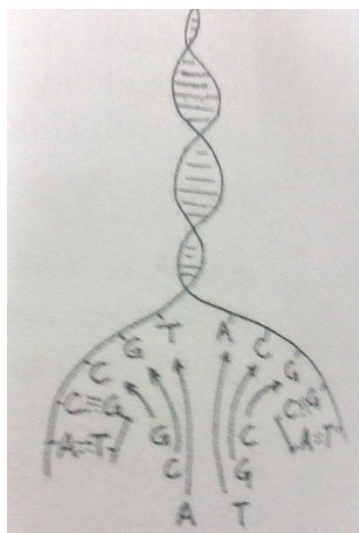
5. A segment of DNA was analyzed and calculated to contain 26 guanine molecules and 34 adenine molecules.

How many nucleotides does this segment of DNA contain all together? Explain how to determine your answer.

26 guanine + 26 cytosine + 34 adenine + 34 thymine = 120

6. Consider the process of replication.

- a. Sketch this process. (Include base sequences in your sketch)



- b. Explain why the resulting DNA molecules are identical to each other and the parent strand.

The resulting molecules are identical because each one is formed from one of the parent strands by complementary base pairing.

7. Contrast the roles of DNA helicase and DNA polymerase during replication.

DNA helicase is a hydrolytic enzyme. It breaks H-bonds between strands of DNA to expose the bases. DNA polymerase catalyzes the rebuilding of DNA by bonding new nucleotides to the exposed bases with H-bonds and then to each other forming the strands.

8. Define recombinant DNA.

Recombinant DNA is DNA that has been manipulated so that it contains genetic material from different species.

9. Describe the process of using plasmids as a vector to create recombinant DNA.

The plasmid is removed from the bacteria then cut with a restriction enzyme. Foreign DNA is cut with the same restriction enzyme to produce 'sticky' ends that match the plasmid. The foreign DNA is inserted into the plasmid then sealed together by DNA ligase. The plasmid is then reinserted into the bacteria so that it now produces foreign proteins.

10. List two ways that recombinant DNA techniques could affect our day-to-day lives.

Production of medicines, drugs etc (faster and cheaper), and increasing the amount and variety of the world's food supply.

11. What is the name of the process occurring in the picture?

DNA replication.

12. Which strands are parent strands? Which are daughter strands?

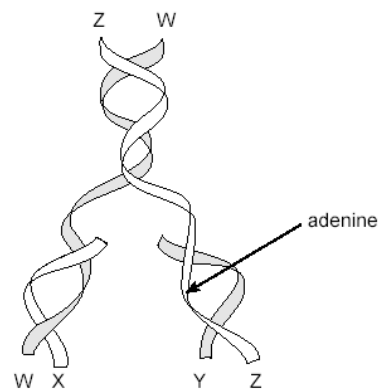
W & Z are parent. X & Y are daughter.

13. If adenine is located on strand z at the position shown, then at the

same location: strand y must be thymine.

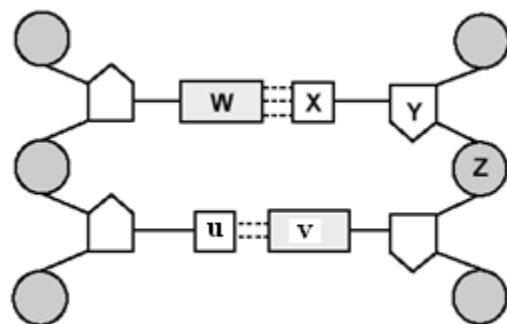
strand x must be adenine.

strand w must be thymine.



Correctly identify the parts labeled in the diagram.

u thymine
v adenine
w guanine
x cytosine
y deoxyribose
z phosphoric acid



14. The parts labeled x, y and z make up a DNA nucleotide.

15. How is one DNA strand attached to another DNA strand?

Hydrogen bonds between complementary bases

16. A bacterial nucleic acid containing the human insulin gene is an example of recombinant DNA.

17. Where does DNA replication occur? In the nucleus

18. What does it mean to "unzip" DNA during replication? Break the H-bonds between complementary base pairs and separate the 2 strands of the DNA helix.

19. What are the subunits of a nucleotide?

Nitrogen base, 5-carbon sugar, phosphoric acid

20. What's the name of the enzyme which joins the complementary nucleotides?

DNA polymerase

21. Why is DNA replication called semiconservative?

It results in two separate identical DNA molecules, each with an original strand as well as a new strand.

22. What is complementary base pairing? The structural relationship which H-bonds adenine only with thymine and guanine only with cytosine.